

DAP MONITOR MODELS

| | |
|-----------------|--|
| DAP II MONITOR | Single phase permanent isolation detector. |
| DAP III MONITOR | Three phase permanent isolation detector. |

ACCESSORIES FOR DAP MONITOR

| | |
|-----------|--|
| REP-MDAP | Terminal repeating signals of a DAP Monitor with display of isolation level. |
| REP-U DAP | Terminal repeating alarms up to 10 DAP Monitors, with two wires communication. |
| DAPsystem | Control and supervision system for a network up to 32 DAP Monitors. |

SAFETY NOTICES

This unit has been designed according to rules UNE 20615(78), UNE 206151erC(80) UNE 206152onC.(85), EN60601-1, EN60601-1-1, EN60601-1-2 (includes EN 55011 and EN 61000-4-2 , EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5), EN 60601-1-4 and it is supplied in good conditions.

Correct and safe operation of this product presupposes transport, storage, installation and mounting according to the rules as described in this User Manual.

The unit does not dispose of fuse. Therefore, relevant protection parts should be envisaged.

It is necessary to take precautions in order to increase safety, such as:

- Functions that are not relevant for the safety of the installation are managed electronically.
- Such functions whose breakdown may cause large material damages or even personal damages, are made using conventional control elements (electromechanical).

The above considerations are independent from the type, manufacturer and country of origin.

Cod. MU750301040909-0



AFEISA

AFEI Sistemas y Automatización, S.A.

Provença, 533 Local A - 08025 BARCELONA (Spain)
Tel. (34) 93 446 30 50 - Fax (34) 93 446 30 51
http://www.afeisa.es email: afei@afeisa.es

Design and printed in Spain

DAP MONITOR
PERMANENT ISOLATION DETECTION UNIT

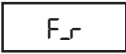



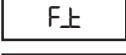

USER MANUAL



IMPEDANCE MEASURE

To initiate the impedance measure of the installation, press the keys <VALIDAR> and <CLAXON> for 5 seconds. From this time, it will be measuring the impedance, the display of the intensity level in each phase will change every 7 seconds.

The sequence will be as follows:

| | |
|---|--|
|  | Start of impedance test in R phase. |
|  | Impedance measured in R phase. |
|  | Start of impedance test in S phase. |
|  | Impedance measured in S phase. |
|  | Start of impedance test in T phase. (if being a three-phase DAP Monitor). |
|  | Impedance measured in T phase. (if being a three-phase DAP Monitor). |

TRIAL TEST

With the TEST key of DAP Monitor, you can perform a system test during 5 seconds, then finishing automatically. If the «CLAXON» key is pressed before 5 seconds occurs, the test will then finish.

Said test will cause an equivalent leakage higher than 5 mA, without affecting the impedance of the grounded system. If same works correctly, the Test led will light on and the alarm buzzer will be activated, but the alarm red led will not be lighted.

The buzzer will actuate just as if it were an isolation leakage alarm, automatically stopping when the test finishes or else waiting for the operator to stop same (consult point «How to configurate the unit»).

If the test starts by pressing the relevant key from a repeater, it will then actuate same way, lighting on the Test led, and if the «CLAXON» key of same is pressed, the test will also finish before 5 seconds.

INDEX

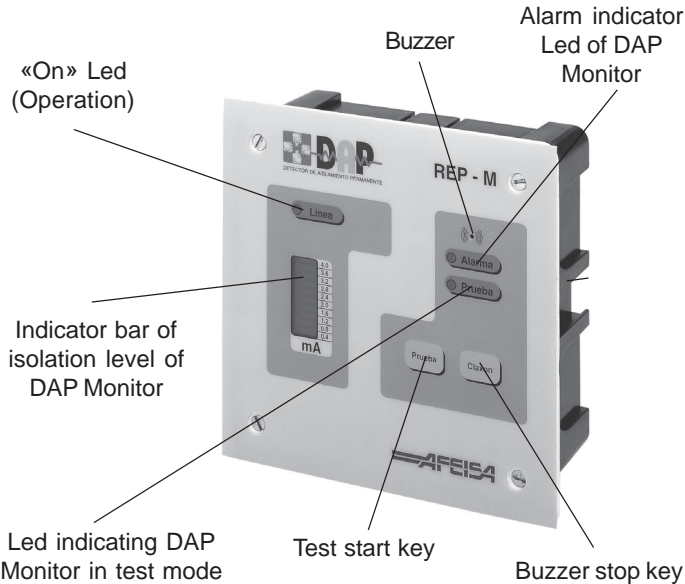
| | |
|---|----|
| - Technical features..... | 2 |
| - Safety warnings..... | 3 |
| - Storage and installation..... | 3 |
| - DAP operating description..... | 4 |
| - Alarm indications..... | 5 |
| - Starting-up of the unit..... | 6 |
| - Connectors identification..... | 7 |
| - Single-Phase Electrical Connecting..... | 8 |
| - Three-Phase Electrical Connecting..... | 9 |
| - Communications..... | 10 |
| - Communications Ports Connecting..... | 11 |
| - Display elements..... | 13 |
| - Display operation..... | 13 |
| - Leds operation..... | 14 |
| - Keyboard operation..... | 15 |
| - Configuration Description..... | 17 |
| - How to configurate the unit..... | 18 |
| - Description of REP-M and REP-U Repeaters..... | 22 |
| - Measure of impedance..... | 24 |
| - Test..... | 24 |
| - Errors and breakdowns diagnosis..... | 25 |

DESCRIPTION OF REP-M AND REP- U REPEATERS

Electric supply for the repeaters is given by the own DAP Monitor at 12 Vcc, thus it is not necessary to connect the repeaters to the equipotential network.


There are two types of repeaters:

- REP-M repeater is an unit designed to work with one only DAP Monitor, to carry out all functions in a remote way. It disposes of a leds bar to indicate the isolation level which the DAP Monitor is measuring, alarm indication led, horn stop key, key and test indicator.



- 22 -

SAFETY WARNINGS

WARNING: Symbol  means that there is a risk for the user, so information concerned should be looked for in the manual.

Whatever use of the equipment in any way not specified by the manufacturer can endanger safety of the unit and affect user protection.



Handling or installation of the unit must be made disconnected from the network.

STORAGE AND INSTALLATION

It is recommended to store the unit together with its respective packing box, having in mind climatic conditions as pointed out at item: Technical Features.

This unit does not dispose of switch and fuse, therefore a magnetothermic switch should be installed, with a distance between open contacts higher than 3 mm. Previous works for installation purposes are not required, only take care of the relevant drill hole in the cabinet to place the unit.

When placing the unit, should be noted the minimum dimensions concerning ventilation and connection of the wires of the inputs/outputs of the unit.

For the connections to the unit terminals, it is recommended to use a cable having maximum section of 2 mm.

Referring to the cables to be connected in the unit terminals, they should be secured to each other using a nylon clamp or similar, so that in case any cable releases from a terminal, there should not be any accidental contact either with earth or other equipments.

MAINTENANCE

DAP Monitor does not require any Kind of special maintenance.

Items to bear in mind when making revisions:

- A test of the unit can be made (Trial Test), please refer to page 24 of this manual.
- Check the state of cables, rivetted terminals and tightened couple of the terminals.



To clean front side, just use a slightly damped cleaning cloth (not wet) with water and neutral soap, but not with an abrasive cleaner.

- 3 -

HOW TO CONFIGURE THE UNIT

After having or not configured the connection of a repeater, you should configure the DAP Monitor number for communication with DAPsystem.

Check that the DAP Monitor number is not configured in other DAP Monitor connected in the DAPsystem PC.



Enter DAP Monitor number.
Number should be between 01 and 99.
To change value, press  key and to validate same, press  key.

n P 0 1

Following configuration method for buzzer operation will be shown:

Enter desired option for buzzer operation.
They options are:
cL-0 = Buzzer will stop when pressing <CLAXON> key.

cL-1 = Buzzer will stop immediately after the intensity level has decreased below the fixed level.

To change option, press  key and to validate same, press  key.

cL-0

cL-1

- 20 -

ALARM INDICATIONS

DAP Monitor indicates the following alarm types:

- Isolation leakage detection according to the programmed order value.
- Earth-interruption detection.

When detection of isolation leakage occurs, then an acoustic alarm will be released (buzzer) and a luminous one as well (Alarm Led). Acoustic alarm can be silenced by pressing the buzzer Key if same is programmed in manual mode. If buzzer is programmed in automatic mode, then it will finish ringing when the leakage disappears.

At the display will be shown the leakage value which is causing said alarm.

4.45

If the unit detects lack of continuity at the ground-connecting-board, if previously connected the reference (REF) as per the scheme indicated in this manual, the following message will be shown in the display:

no_t

This alarm prevails over the leakage detection alarm.

Operation of the no_t alarm is the same as when detecting an isolation leakage.

- 5 -

HOW TO CONFIGURE THE UNIT

When the unit is given tension, the word DAP and the inner software version which the unit has are shown on display; following the isolation level will be indicated. Afterwards you can have access to the configuration of the unit.

To enter in unit configuration, keys **<CONSIGNA>** and **<MEDIDA>** must be pressed at the same time for 5 seconds, then the request for password entry will be shown on display.

P_00

Enter accessing password.
By default it is 00.

To change digit, key **<▲>** should be pressed, and to validate same press **<◀>** key.

Following you will access the configuration menu, and the first data which will be requested to us will be the supply tension level to be programmed.

220

Enter installation tension.

They are as follows:
220 = 220VAC tension.

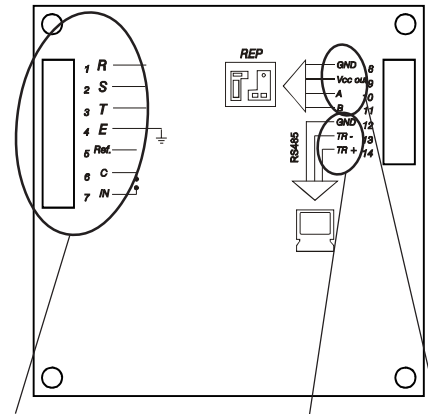
230 = 230VAC tension.

230

To change tension, press **<▲>** key, and for validation press **<◀>** key.

- 18 -

IDENTIFICATION OF CONNECTORS



ELECTRICAL CONNECTION CONNECTOR:
- PHASES CONNECTION
- EARTH CONNECTION
- GROUND CONNECTING BOARD CONTROL
- ALARM INPUT

COMMUNICATIONS CONNECTOR FOR REP-M AND REP-U REPEATERS
(refer to point Connecting Communications Port)

Terminals description:

| Term. | Description |
|-------|------------------------|
| 1 | R phase |
| 2 | S phase |
| 3 | T phase |
| 4 | Earth |
| 5 | Ground Conn.Board Ref. |
| 6 | ALARM Common |
| 7 | ALARM |

COMMUNICATIONS CONNECTOR FOR DAPsystem
(refer to point Connecting Communications Port)

- 7 -

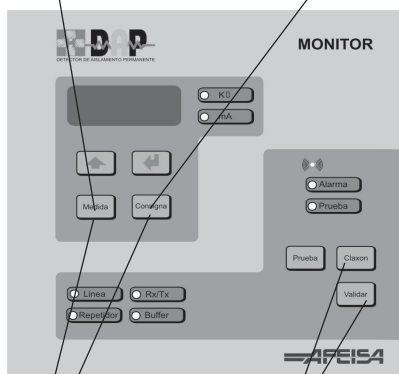
KEYBOARD OPERATION

MEDIDA

Changes read-out of measuring scale from mA to KΩ

CONSIGNA (Order Value)

Shows programmed order value on display.



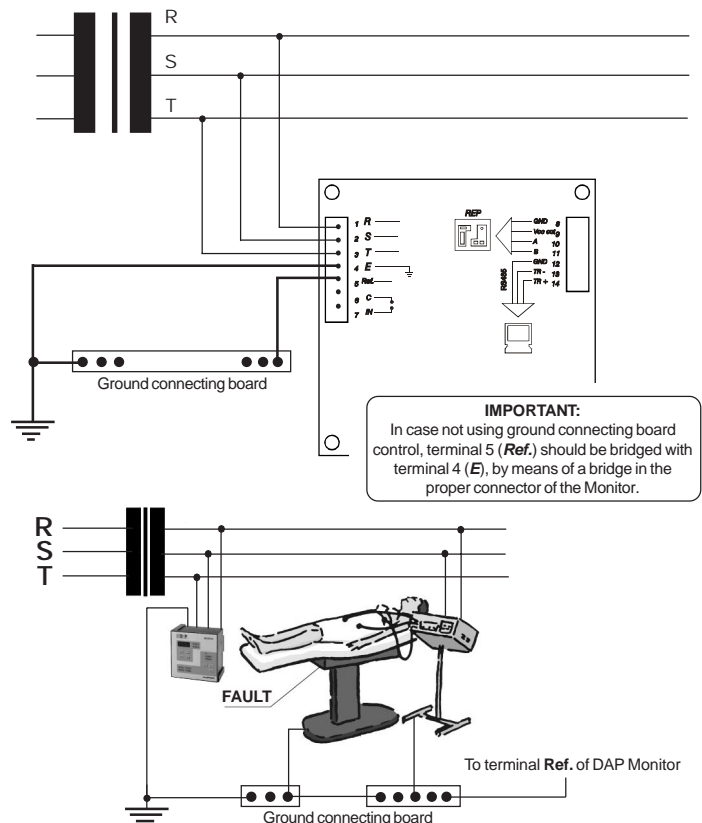
When pressing **MEDIDA + CONSIGNA** at the same time, we will enter into configuration menu of the unit.

When pressing **CLAXON + VALIDAR** at the same time, we will then check installation impedance.

- 16 -

ELECTRICAL CONNECTION DAP III MONITOR (three-phase model)

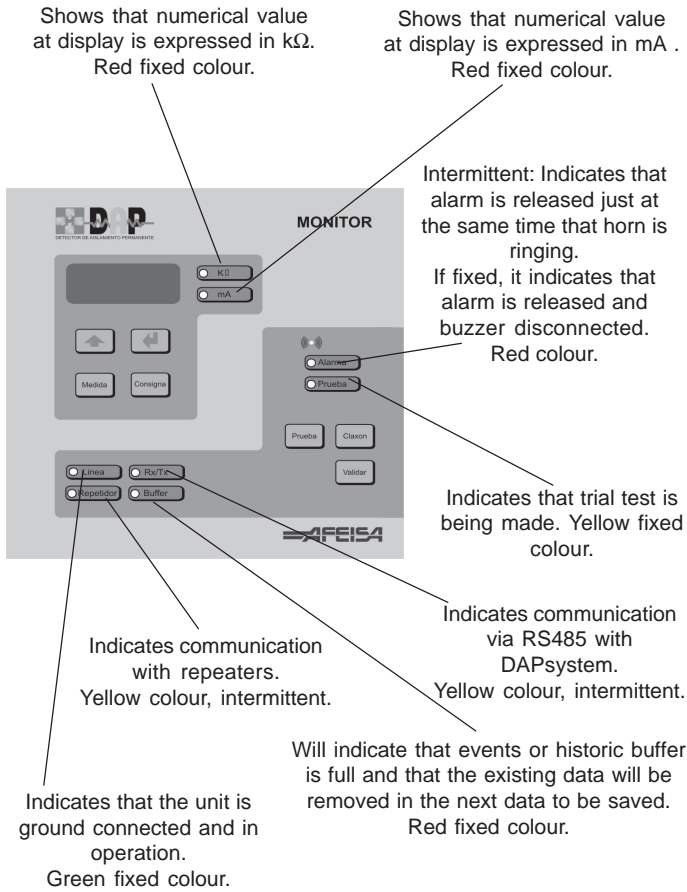
ISOLATION TRANSFORMER ACCORDING TO UNE 20.615 STANDARD



IMPORTANT:
In case not using ground connecting board control, terminal 5 (**Ref.**) should be bridged with terminal 4 (**E**), by means of a bridge in the proper connector of the Monitor.

- 9 -

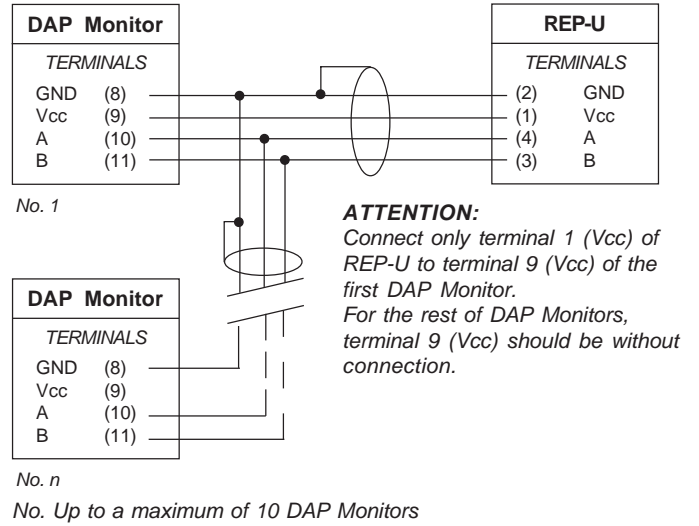
LEDS OPERATION



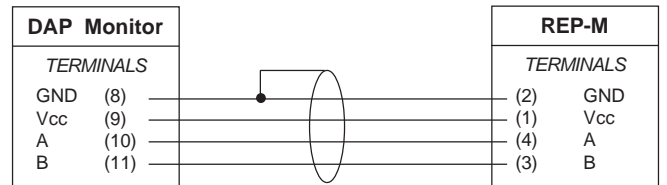
-14-

COMMUNICATIONS PORTS CONNECTION

Connection of REP-U repeater with DAP MONITORS



Connection of REP-M repeater with DAP MONITOR



- 11 -

ERRORS AND BREAKDOWNS DIAGNOSIS

| | |
|---|--|
| LINE LED DOES NOT LIGHT. | Check that the unit is correctly supplied in 1, 2 and/or 3 terminals. |
| THE UNIT RE-STARTS CONSTANTLY. | Supply tension can be too low. |
| DISPLAY OF DAP MONITOR SHOWS ``no_t`` | Check that the furthest end of the ground connecting board has been connected to terminal 5 (Ref.), and ground to terminal 4 (E). If not using ground connecting board control, make a bridge with cable between terminals 5 and 4. |
| DAP MONITOR DOES NOT HAVE COMMUNICATION OR DOES NOT WORK CORRECTLY WITH REP-M OR REP-U. | Check wiring of the repeater. Check if it is active and type of REP used in the configuration of the DAP Monitor. In case of being long distances, place terminal resistances (consult page 10 of this manual). |
| DAP MONITOR DOES NOT HAVE COMMUNICATION OR DOES NOT WORK CORRECTLY WITH THE DAPSYSTEM. | Check RS485 communication cable. Check that the corresponding repeater is configured at the DAP Monitor configuration. In case of being long distances, place terminal resistances (consult page 10 of this manual). Please refer to DAPsystem program manual. |

In case of breakdown or failure, the unit should be delivered to the distributor or directly to AFEI Sistemas y Automatización, S.A. to be duly repaired by the technical service dept.

Total or partial reproduction of this manual is not allowed, neither computerised use of same nor transmission in any way or through whatever mean, either electronic, mechanical, photocopy, register or other methods, without previous written approval by the owners of the Copyright.

© AFEI Sistemas y Automatización, S.A.
Edition: AFEI Sistemas y Automatización, S.A.
Printed: AFEI Sistemas y Automatización, S.A.

Information contained in this manual can be subjected to changes without previous notice and in no case represents an undertaking by the seller's side.

First edition: September 2.004

- 25 -

TECHNICAL SPECIFICATIONS

Internal:

- Real time clock.
- 4-digits numerical display.
- 8 display Leds.
- Keyboard with 7 Keys.
- Buzzer.
- Battery.
- 1 RS485 communication port for DAPsystem.
- 1 communication port for REP-M or REP-U repeaters.

Measure parameters:

- Isolation resistance:
 - Measuring range in KΩ..... 40 kΩ to 1100 kΩ
 - Measuring range in mA..... 0 to 5.00mA
- Values of leakage alarm.....0.4, 0.8, 1.2, 1.6, 2.0, 2.4, 2.8, 3.2, 3.6 and 4.0 mA

Inner Registers:

- Inner registers:..... Alarms, Events and Historic.
- Registers storage: 8 Kbytes EEPROM, cyclic mode.
- Registers capacity:
 - Alarms and Events 500 registers.
 - Historic registers 500 registers.

Electrics and environmental:

- Supply tension 220-230 VAC +/- 20%, 50Hz.
- Consumption at 230 VAC (*)..... 3,5 VA.
- Inner isolation A.C. of 11MΩ with maximum own leakage of 20 µA.
- Measuring tension less than 6V D.C.
- Operation temperature 10°C to 40°C.
- Storage temperature -55°C to 125°C.
- Transport temperature -20°C to 60°C.
- Air humidity (without condensation) 60 %.

Weight and Measures:

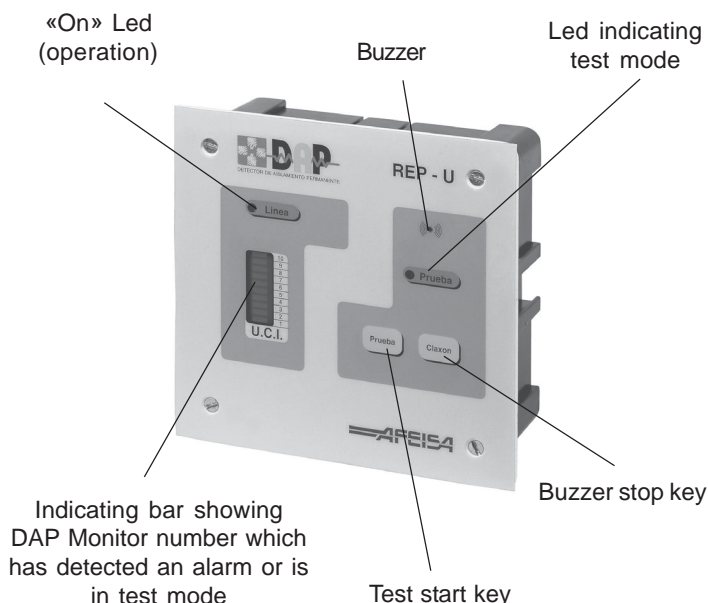
- Weight 1270 gr.
- Dimensions DIN box 144 x 144 mm.
- Front Depth 8 mm.
- Minimum panel depth 110 mm.
- Cabinet drill hole for DAP Monitor 138 x 138mm.

- 2 -

DESCRIPTION OF REP-M AND REP- U REPEATERS

REP-U repeater is an unit designed to work with a maximum of 10 DAP Monitors, for the indication of the unit which has detected an alarm.

It disposes of a leds bar to show the DAP Monitor number in alarm condition, buzzer stop key, key and test indicator.



- 23 -

OPERATION OF DAP MONITOR

- DESCRIPTION -

DAP Monitor is a unit which measures the isolation resistance between any input phase and ground (earth). Supply of the unit is made through the same terminals through the isolation measure is carried out.

The user will program a consign (value) of leakage current, which will be used by the unit to compare same with the instantaneous value which is being measured, and in case that the measured value exceeds this limit, it will then show an alarm.

The unit will also detect alarm of earth-interruption if you connect at E input the initial end of the ground-connecting-board and the final end of that in Ref. input. By doing so, you will be measuring earth continuity, and if due to whatever reason said continuity would be interrupted at any point of the ground-connecting-board, then an alarm would be produced.

You can make a test of all the installation at any time through the TEST key. The unit will cause a leakage equivalent higher than 5 mA without affecting the impedance of the installation.

Furthermore you can measure the existing impedance in the installation by pressing two keys.

DAP Monitor has been designed to work in conjunction with other remote unit which can be a Repeater REP-M (operating theatre repeater) or Repeater REP-U (ICU repeater) which will display some parameters of the measuring unit state. Communication will be made through a two wires cable.

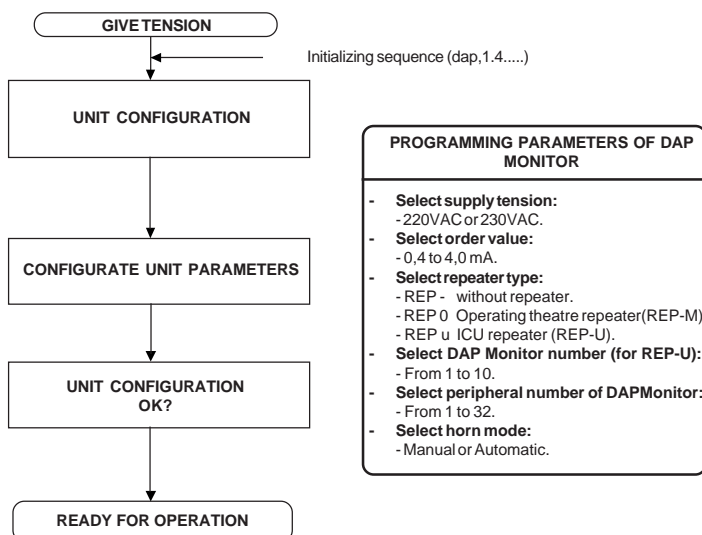
DAP Monitor will store in EEPROM all alarms, events and historic registers which are generated in the installation, in order to be processed by means of the DAPsystem program through the RS485 communications port.

From DAPsystem program you will also be able to change the units configuration and supervise the installation state, as well as reading the registers, events and alarms which the units have generated in the installation.

- 4 -

STARTING UP OF THE UNIT

Starting up of DAP Monitor is made by means of the DAPsystem program; in case of not disposing of it, then it will be made through the keyboard of the unit itself.



Default communications parameters are:



9600 bauds
NO parity
8 bits length
1 stop bit
Peripheral No: 99

TO GET THE UNIT HAVING DEFAULT CONFIGURATION, PLEASE REFER TO POINT «CONFIGURATION DESCRIPTION» IN THIS USER MANUAL.

- 6 -

HOW TO CONFIGURE THE UNIT

Following there will be shown the possibility of temporary establishing communications parameters by default:

C.96.0

They options are:

C.96.0 = Configuration of RS485 communications port is as programmed by the DAPsystem.

C.96.1 = RS485 communications port configuration becomes:

Bauds 9600
Parity No
Bit Length 8
Stop Bits 1

When the unit is switched off and on again, it will restore the configuration programmed by the DAPsystem again.

To change option, press <↑> key, and to validate same, press <↵> key.

C.96.1

When pressing <↵> key after this last parameter configured, leave programming mode and the unit is then ready to work.

NOTE:

In case that DAP Monitor is for more than 30 seconds in the configuration menu without a key being pressed, it will then quit the menu, moving to normal working state. Furthermore if a non operative key is pressed inside the configuration, then it will quit in order to avoid bad manipulations.

When you leave the configuration menu, either due to time or by an incorrect key stroke, the modified values will not be saved, therefore the previous values will be restored.

-21-

HOW TO CONFIGURE THE UNIT

Following the leakage current order value for alarm indication will be shown (please refer to point «Configuration description»).

00.40

Enter desired value for leakage level detection.

Values are as follows:

0.4, 0.8, 1.2, 1.6, 2.0, 2.4, 2.8, 3.2, 3.6, 4.0mA.

To change value, press <↵> key and to validate same press <↵> key.

to

04.00

After that, the option where you will configure whether you connect a repeater or not will be shown (consult «Configuration description»).

rEP-

Enter desired option.

They are as follows:

rEP = No repeater is connected.

rEP0 = a REP-M repeater is connected.

rEPu = it is connected to a REP-U repeater*.

To change value, press <↵> key, and to validate press <↵> key.

rEP0

rEPu

* In case of configuring rEPu option, once previous action has been validated, you will be asked for the identification number of DAP Monitor for the REP-U repeater.

Make sure that the identification number is not configured in other DAP Monitor connected in the same REP-U repeater.

Enter identification number.

Number must be between 01 and 10.

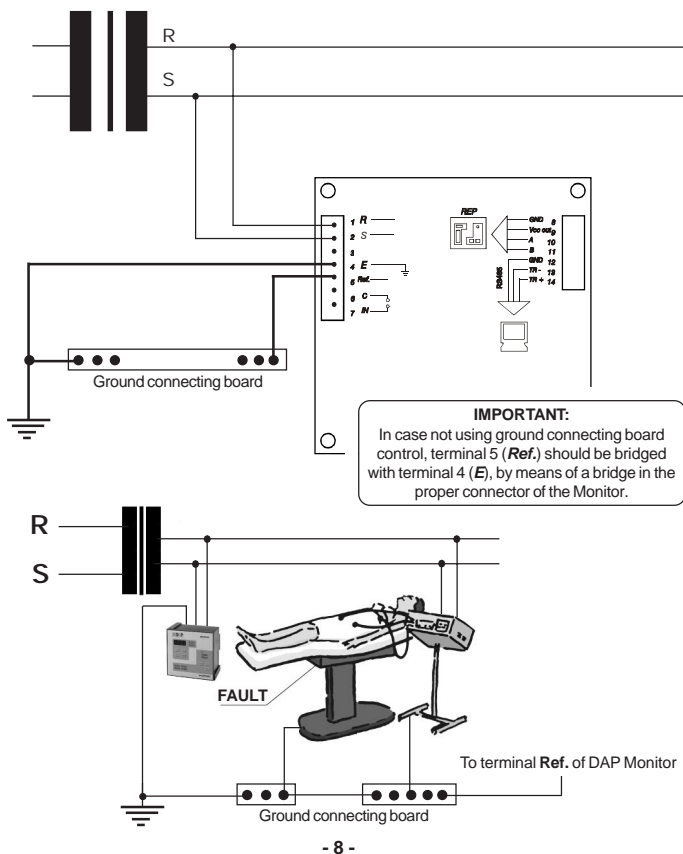
To change value, press <↑> key and validate by pressing <↵> key.

nu01

- 19 -

ELECTRICAL CONNECTION DAP II MONITOR (single-phase model)

ISOLATION TRANSFORMER ACCORDING TO UNE 20.615 STANDARD



- 8 -

CONFIGURATION DESCRIPTION

- Configuration of DAP Monitor is made by the same keyboard, when pressing simultaneously the MEDIDA + CONSIGNA keys.
(please refer to point «How to configure the unit»).

- Parameters to be configured are:

| | |
|---|---|
| PASSWORD ⁽¹⁾ | : - - |
| TENSION SELECTION | : 220Vca / 230Vca |
| ORDER VALUE SELECTION | : 0.4 / 0.8 / 1.2 / 1.6 / 2.0 / 2.4 / 2.8 / 3.2 / 3.6 / 4.0mA. |
| REPEATER SELECTION ⁽²⁾ | : Without repeater Rep - (rEP-) With repeater Rep-M (rEP0) With repeater Rep-U (rEPu) |
| IDENTIFICATION FOR REP-U ⁽³⁾ | : 1 ... 10 |
| NUMBER OF DAP MONITOR | : 1 ... 32 |
| BUZZER ⁽⁴⁾ | : Option 0 / Option 1 |
| DEFAULT COMMUNICATIONS ⁽⁵⁾ | : Option 0 / Option 1 |

(1) Can only be programmed by PC. (consult DAPsystem manual). If this option has been selected, you will not able to enter into unit configuration unless you enter correct password.

(2) Option to select repeater type wanted to be connected.

(3) This option is only accesible when previous option is configured as REP-U.

(4) Option 0 = Buzzer will stop when pressing <CLAXON> key.
Option 1 = Buzzer will stop just immediately after the intensity level has decreased below the fixed level.

(5) Option 0 = Configuration of RS485 communications port are just as programmed by the DAPsystem.
Option 1 = Configuration of RS485 communications port becomes: 9600, NO, 8, 1.

- 17 -

COMMUNICATIONS

- The unit disposes of a RS485 communications port, and other one of two wires for communication with repeaters REP-M and REP-U, both of them are optoisolated.

- Following we are describing the connector terminals where communications port RS485 and two-wires communication port are located:

| COMMUNICATIONS connector connections | | | | |
|--------------------------------------|---------|---------------|--------------------|---------------------|
| Terminal nº | Signal | Description | Cable Section (mm) | Input/Output |
| 8 | GND | GND | 0,25 or 0,50 | REP-M o REP-U |
| 9 | Vcc out | Supply | 0,25 or 0,50 | |
| 10 | A | A Signal | 0,25 or 0,50 | |
| 11 | B | B Signal | 0,25 or 0,50 | DAPsystem |
| 12 | GND | GND | 0,25 or 0,50 | |
| 13 | TR- | Signal TxRx - | 0,25 or 0,50 | |
| 14 | TR+ | Signal TxRx + | 0,25 or 0,50 | |

Type of cable for communications

- The recommended communication cable type should be minimum 2 couple with shielding (mesh) and with a section 0,25 or 0,50 mm, both for repeaters and DAPsystem port.

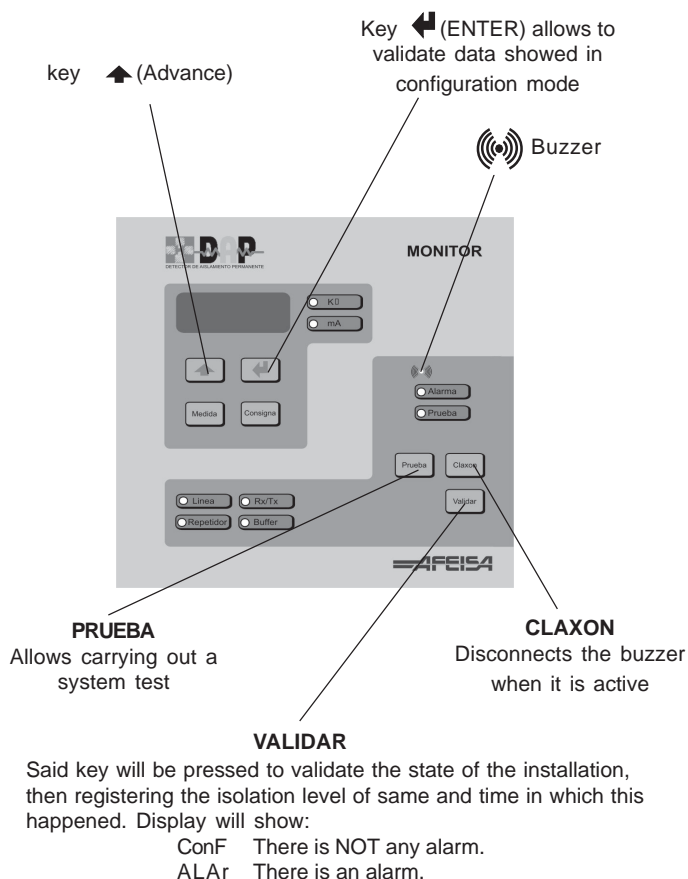
DAPsystem

- In long and high speed RS485 communication lines it is suggested to connect terminal resistances at the beginning and end of said lines.
So, in case of working with DAPsystem with the RS485 communications port (TR-/TR+) of the DAP Monitor, if the distance between the PC and DAP Monitor is considerable, should be connected a 120 ohms resistance between TR- (Terminal 13) and TR+ (Terminal 14) at the DAP Monitor which is most remote.

To connect the PC terminal resistance, please refer to DAPsystem manual.

- 10 -

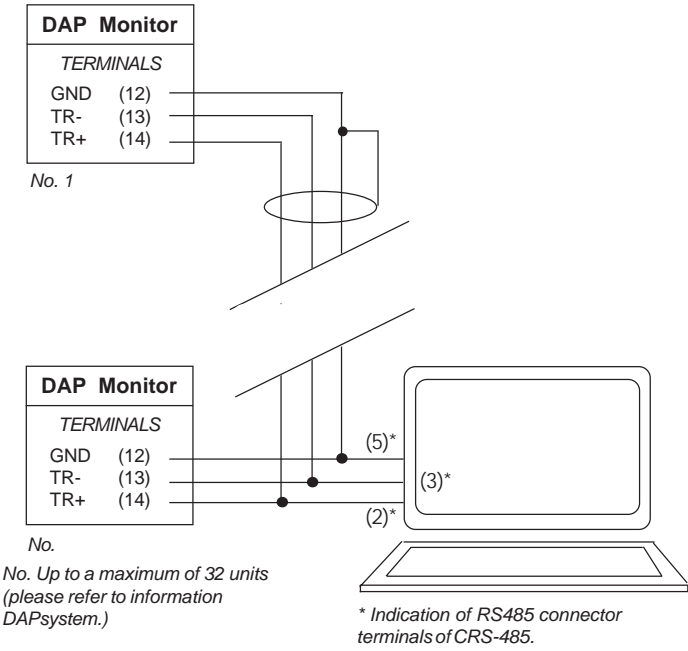
KEYBOARD OPERATION



- 15 -

COMMUNICATIONS PORTS CONNECTION

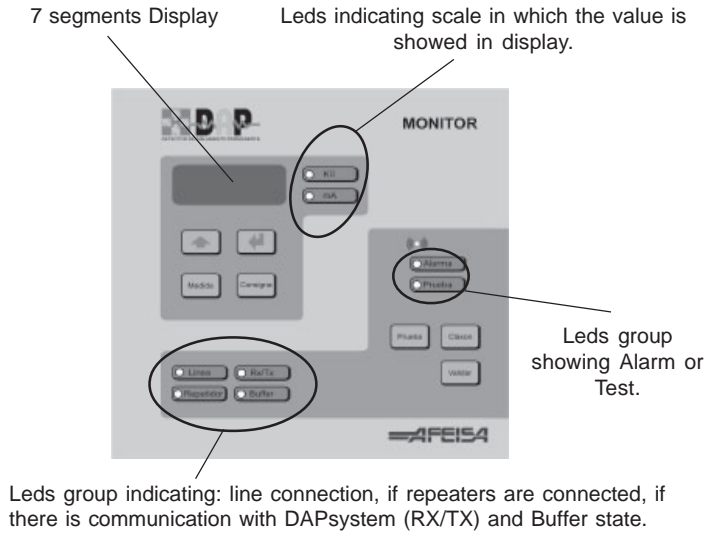
DAPsystem connection (RS485)



IMPORTANT NOTE:

Recommended communication cable type for connection between DAP Monitors and also connection of same to the PC, should be min. 2 couples with shielding (mesh) with a section of 0,25 or 0,50 mm. (special cable for data communications).

DISPLAY ELEMENTS OF DAP UNIT



DISPLAY OPERATION

DAP unit disposes of a 4-digits display of 7 segments each one, in which certain informations such as: unit version, leakage value etc. are shown.

8.8.8.8

| | Display | Description |
|------|---------|-------------------------|
| dAP | dAP | Alphabetical characters |
| 1.3 | 1.3 | Digits version. |
| 3,18 | 3.18 | Digits with decimals. |